STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF VASSAR COLLEGE.

XLI. The Relation of the Pleasantness of Color Combinations to that of the Colors Seen Singly

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Professor Geissler contributed to the Titchener Commemorative Volume a study of the affective tone of color combinations, the most positive result of which was to show that "the greater the pleasantness of the individual constituents, the greater will be the pleasantness of the combination." The materials used were the following saturated Bradley colors; red, orange, yellow, green, blue-green, blue, and purple. These were shown in areas of 5 cm. a side, placed side by side to make a strip 10 cm. wide. When single colors were to be judged, the left half of this strip was covered. The background was grey. The method was that of Paired Comparison; one color combination, or one single color, being shown 5 cm. above the other.

The design of our own experiments was to see whether the principle that the pleasantness of a color combination varies directly as that of its components would hold good when absolute rather than comparative judgments of affective value were made, and in general to see what light could be thrown on the problem by altering the method. Instead of the Method of Paired Comparison, we used the one which has been so often employed in our laboratory, that of presenting a single impression, either a color combination or a single color, and asking the observer to express his judgment of its pleasantness by using the number 1 to mean 'very unpleasant,' 2 'moderately unpleasant,' 3 'slightly unpleasant,' 4 'indifferent,' 5 'slightly pleasant,' 6 'moderately pleasant,' and 7 'very pleasant.' Another important difference between our method and Geissler's lay in our *use of shades and tints as well as saturated colors.* We used twelve saturated colors of the Bradley series, twenty-four shades, and twenty-eight tints. The colors were pieces 3 cm. square, pasted on white cards 2½ by 3 inches. Where color combinations were used, two of these squares were pasted side by side on the same card. Each of the two experimenters used a different set of colors, comprising thirty-two of the sixty-four single colors, which were shown and judged first, and sixteen combinations of these colors, which were shown and judged later in the same sitting. There were thus in all thirty-two combinations used. The number of observers, all women college students, was 105 for one experimenter, 106 for the other.

The relation between the pleasantness of the combinations and that of the single colors was found in the following way. The total affective value of every color, when shown alone, was determined by adding the numbers by which the observers expressed their

judgments of its pleasantness; the sum, of course, would be larger, the pleasanter the color was found by the observers as a group. Then the sums thus obtained for each of two colors that were shown in combination were added; the combined sum represented the combined affective value of these colors when they were shown singly. This being done for each of the pairs of colors, it was possible to arrange them in an order representing their pleasantness as determined solely by their appearance singly. Then the numbers which represented the affective judgments of the observers on the combinations as such were added, and the combinations arranged in the order of the size of these sums. Evidently the rank difference correlation between these two arrays will give the degree of relationship between the pleasantness of a color combination and the individual pleasantness of its component colors. This correlation proved to be plus .747, with a P.E. of .0119. It is clear that to a very considerable extent, the pleasantness of a color combination depends upon the pleasantness of the individual colors.

But this fact can hardly be taken, as Professor Geissler seems to take it, for a manifestation of the simple summation of feelings. If the agreeableness of a color combination is due to summation of the agreeableness of its components, or its disagreeableness to summation of the disagreeableness of its components, then a combination of two pleasant colors should be pleasanter than either of the components when seen singly; and a combination of two unpleasant colors should be unpleasanter than either of the components seen singly. This follows from the orthodox doctrine of the simplicity of feeling tones. Now in the entire series of our experiments, in which thirty-two combinations were used, with over a hundred observers judging each combination, there were 861 cases where the component colors, when judged singly, were both found agreeable. In 263 of these cases, or 30.5%, the combinations of these colors were found positively disagreeable. There were 465 cases where the component colors, judged separately, were both found disagreeable; of these 72, or 15.4%, were agreeable in combinations. These figures support the conclusion to which ordinary experience points, that *the unpleasantness or pleasantness of a color combination is derived not merely from summation of the affective tones of its components, but from another factor dependent on the combination itself.* Our results suggest also that this factor more often gives rise to unpleasantness than to pleasantness; that it is easier to get an ugly combination out of two pleasing colors than a pleasing combination out of two disagreeable colors. It may, however, be true that our thirty-two combinations happened to include more cases where the combination factor operated to produce unpleasantness. The relation of the two factors, that derived from the component colors which is responsible for our correlation of plus .74, and that derived from the combination, may be conjectured to depend on whether attention is attracted to the colors as separate colors, when they appear in the combination, or to the total effect.